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OWNER CHARACTERISTICS AND DISTRIBUTION OF LAND OWNERSHIP IN THE EASTERN GREAT PLAINS

U.S. DEPARTMENT OF AGRICULTURE/ECONOMIC RESEARCH SERVICE
RESOURCE DEVELOPMENT ECONOMICS DIVISION/ERS-197

PREFACE

This study is based on data obtained from a mail survey of landowners in the Great Plains States conducted in 1957-58 by what was then the Farm Economics Research Division, Agricultural Research Service. Detailed information on the results of the survey--the number of landowners, the amount, value, and use of land they owned, and characteristics of landowners--were reported in two earlier publications: Land Ownership in the Great Plains, a Preliminary Report (ARS 43-93, June 1959) and Land Ownership in the Great Plains, a Statistical Summary (Stat. Bul. 261, April 1960).

This report is an analysis of the relationship of selected characteristics of landowners in the Eastern Great Plains to the size distribution of their landholdings. It was undertaken to determine whether personal characteristics such as inheritance, age at acquisition, length of ownership, owner occupation, and others differ significantly over the range of ownership holding changes. The relationships reported in this study change slowly and will be valid for some time after the survey was made.

Special acknowledgment is extended to Gene Wunderlich of the Resource Development Economics Division, who planned the study, suggested the statistical tests, and conducted preliminary investigations.

Washington, D. C. November 1964

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SUMMARY

In 1958, individual landholdings in three specialized farming regions of the Great Plains ranged in size from small tracts to units of thousands of acres. What factors help explain this distribution? Do owners of the small holdings differ from owners of large holdings? To answer these questions, the relationships between certain landowner characteristics and the size distribution of landholdings in each region were examined. Some findings were:

1. As age of owner and length of ownership increased, so did the size of ownership units.

2. Owners who just acquired land early in life tended to own the largest tracts. These owners had more time for capital accumulation and, in this instance, probably benefited from the favorable economic conditions of the early postwar years.

3. The number of owners who purchased all of their land was about the same for large and small holdings.

4. Inheritance, as a method of acquisition, appeared to be important for the opportunity it presented. Owners who acquired land solely by inheritance tended to have smaller landholdings. Owners who not only inherited, but also purchased land, tended to acquire the larger holdings.

5. Tenure, occupation, and type of owner were significantly related to size of ownership units. Active farmers and husband and wife owners tended to own large tracts while landlords, people in occupations other than farming, and single men and women generally owned the smaller holdings.

6. The relative importance of the characteristics examined varied among the regions studied. In the spring wheat region several characteristics exhibited less pronounced relationship with the size of landholdings than in the other regions. The lower capital requirements for land acquisition in this region may possibly explain the differences noted.

OWNER CHARACTERISTICS AND DISTRIBUTION OF LANDOWNERSHIP IN THE EASTERN GREAT PLAINS

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INTRODUCTION

Land is a major source of wealth for a great number of Americans. In 1962, farm and ranch land of the conterminous United States was valued at $138 billion; two-thirds of the value of all farm assets (7). 1/ The exact number of individuals who own rural land is not known, but in the 10 Great Plains States alone more than 1 million people were estimated to have some direct ownership interest in land (2). In seven Southeastern States 1 1/3 million persons held some land interests (5).

Distribution of landed wealth varies widely among owners, however. The size of ownership units varies from small rural residential tracts to giant holdings, and the degree of ownership control varies from sole proprietorship to fractional undivided interests or other lesser estates in land.

Why Is a Study of Landownership Distribution Important?

Within the framework of our system of private property, ownership is a key factor in determining how land is used and how the benefits that flow from land are distributed. The benefits arising from landownership are closely related to the size and value of landholdings and to the type of ownership interest. Thus a study of landownership distribution is relevant for studies of income distribution.

The family farm concept is strongly imbedded in agrarian thought, and the principle of widespread landownership by farm operators has received strong support from the Federal Government. The rise of tenancy in the early years of this century led to publicly sponsored credit and foreclosure moratorium laws to strengthen this principle. Corporation farming is viewed today by some as a possible threat to widespread landholding. Yet relatively little attention has been given to the characteristics of landowners that affect the dispersion or concentration of ownership.

To a degree, present landowners can determine the future patterns of landownership. Farmers are often encouraged to use their rights to devise

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1/ Numbers in parentheses refer to Literature Cited, p. 26.

their land on the assumption that such transfers between generations will assure the continuation of family-size farms. The effect of these transfers on the distribution of land, however, has not been adequately determined, and their desirability has been questioned (3).

With our rapidly changing agriculture, a flexible system of ownership and land use can facilitate the adjustments in farm size and organization necessary for efficient production. Knowledge of the relationships between individuals and land distribution may indicate where adjustments may be made most expeditiously. Conversely, this knowledge provides a means for predicting which individuals will be most affected by factors that tend to impede land use or tenure changes.

Factors Examined

This study was designed to provide empirical data on the relationship of certain characteristics of rural landowners and the distribution of landownership. The factors examined are those related to the age, sex and marital status, tenure, and occupation of landowners, and the way in which they acquired landownership.

These characteristics are only a few of those that might be studied. They are, however, characteristics which are readily measured and which are important both in themselves and for the insights they provide into the more complex motivational and economic factors that contribute to the distribution of landownership. Although information on these characteristics is usually obtained in surveys of landownership, little is known of their relationship to size distribution.

Area of Study

This study is based on data obtained from a mail survey of landowners in the 10 Great Plains States made during the winter of 1957-58. 2/ Because of the diversity of farming systems and the variety of geographical and climatic conditions in the Great Plains, this report is limited to three relatively homogeneous subregions within the easternmost Plains States (fig. 1). These regions are:

Region I--The spring wheat region of North Dakota and South Dakota. Eight counties in central and eastern North Dakota and three counties of north central South Dakota were sampled.

2/ A sample of 172 counties was selected on a stratified random basis, and within each county a sample of rural landowners owning tracts of 2.5 acres or more was obtained. The sample was designed to provide reasonably accurate estimates of several items at the State level. Details of the procedures used and an appraisal of the precision of the sample are provided in: Land Ownership in the Great Plains (6).

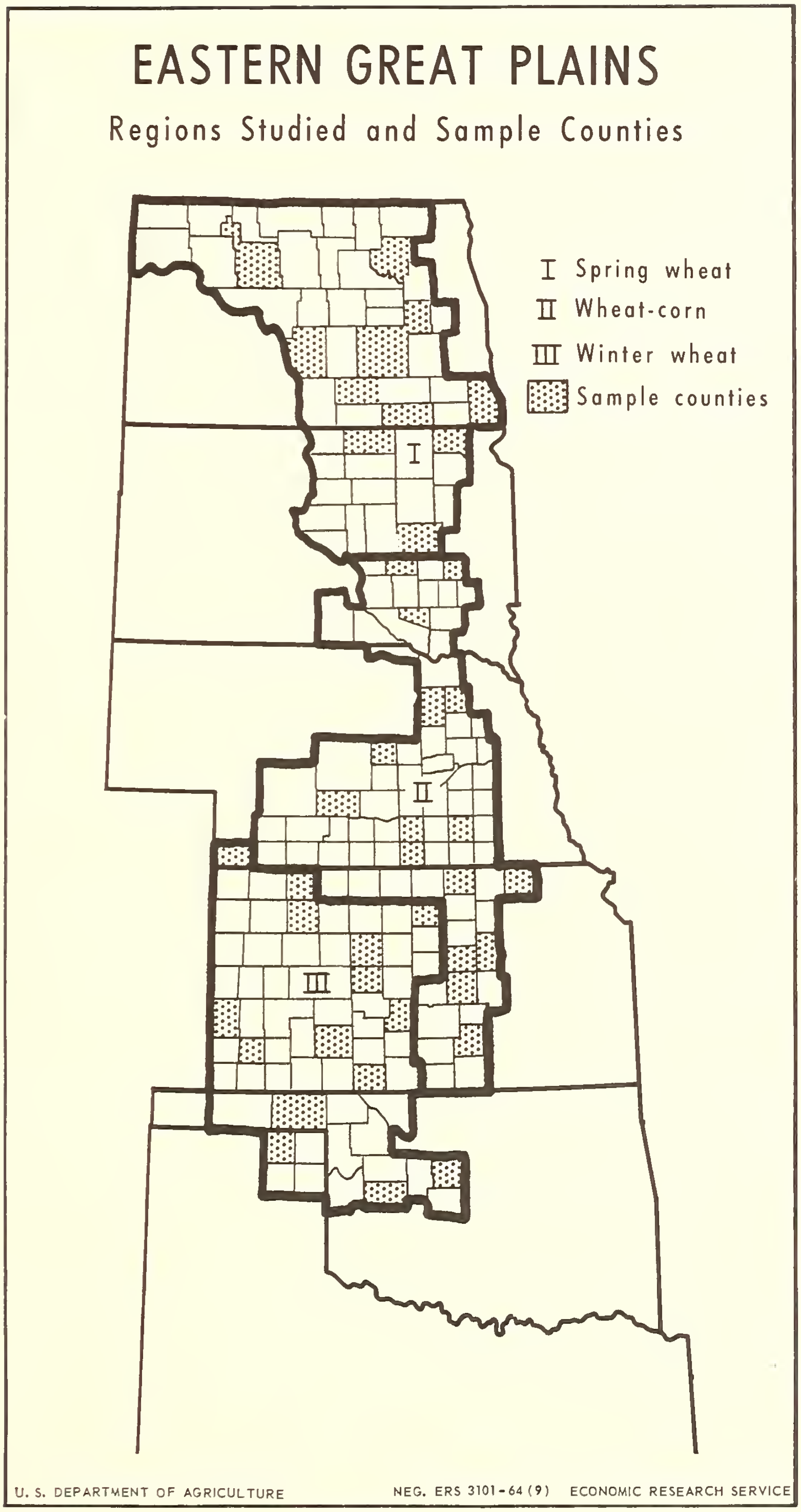
EASTERN GREAT PLAINS
Regions Studied and Sample Counties
I Spring wheat
II Wheat-corn
III Winter wheat
Sample counties
I
II
III
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Figure 1

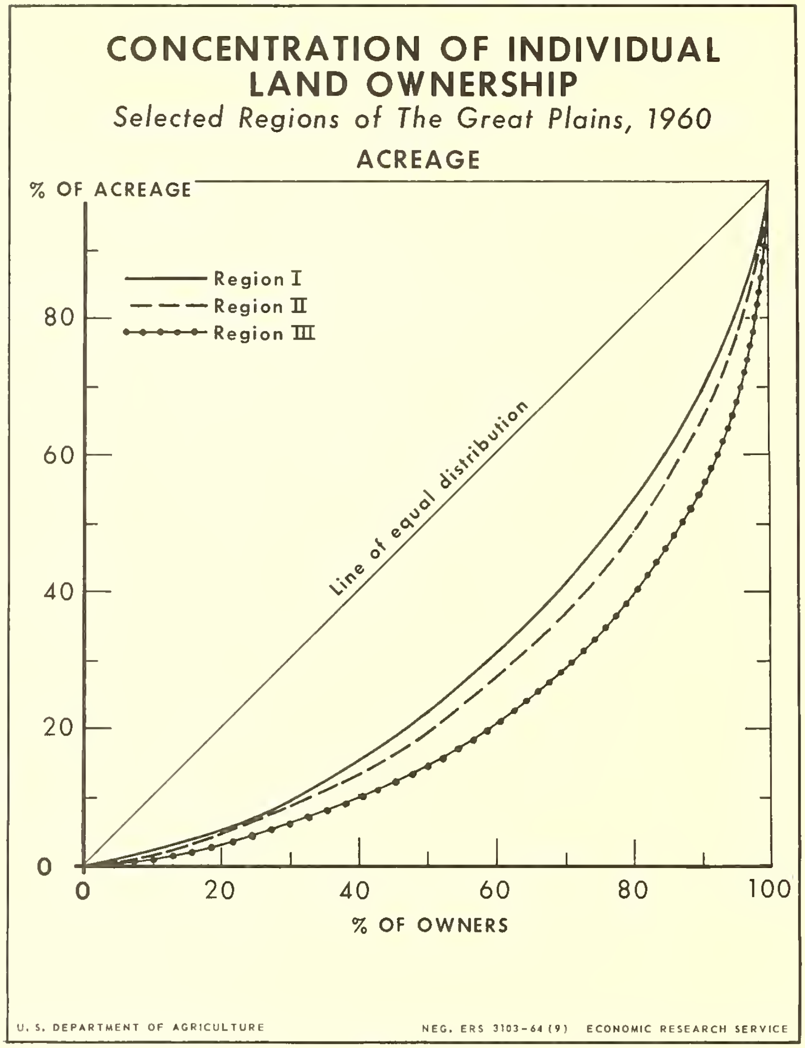

Figure 2

Region II--The wheat-corn region which includes 16 sample counties of south central South Dakota, central Nebraska, and eastern Kansas.

Region III--The winter wheat region of western Kansas and Oklahoma and small sections of Nebraska and Texas (15 sample counties). 3/

In an earlier study of the Great Plains (1), it was estimated that the average farmer in these three regions held total assets in excess of $68,000. Of this amount more than four-fifths represented the value of farm real estate. Thus, a study of the distribution of farmland is, in large part, a study of total wealth distribution for these owners.. The Lorenz curves in figures 2 and 3 illustrate the distribution of land among the landowners. The lowest one-fifth of all owners owned only 3.6 to 5.1 percent of the total land while

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3/ These divisions correspond closely with the farming areas described in Farming in the Great Plains (1).

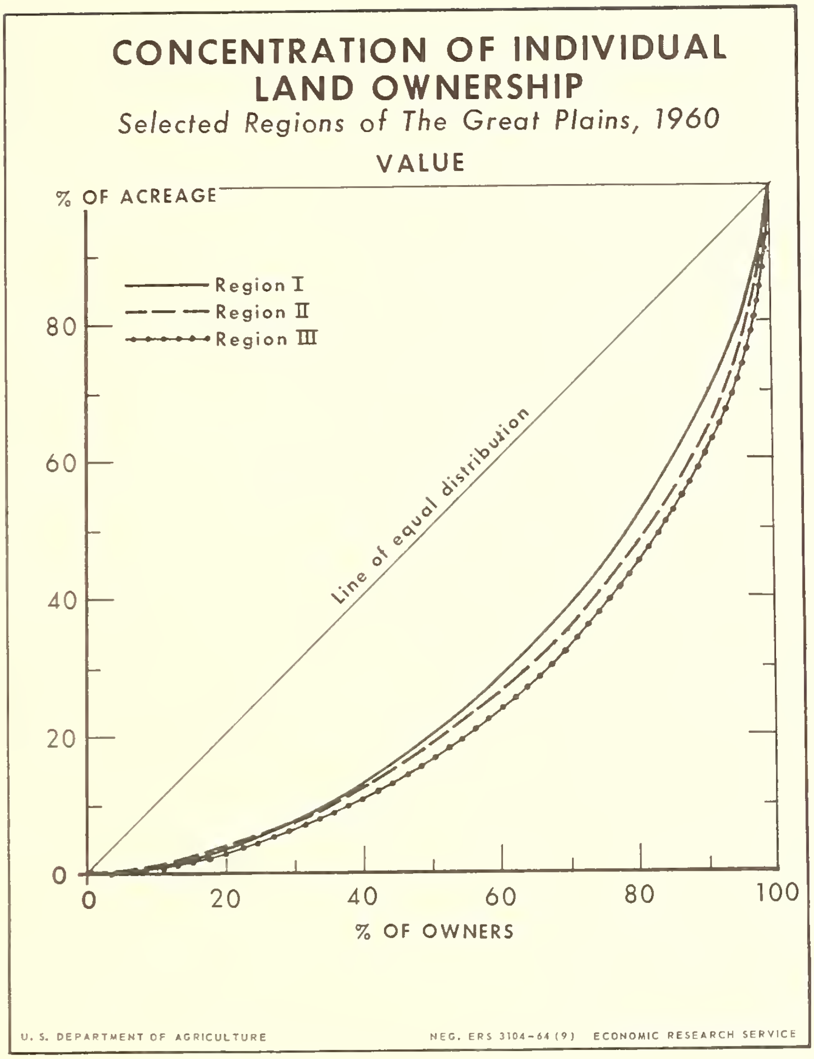

Figure 3

the upper one-fifth owned 46.5 to 60.8 percent. Although value of land was more evenly distributed than acreage, there still remains wide disparity in the holdings of largest and smallest landowners. The lowest one-fifth owned 6.6 to 7.9 percent of total value, while the highest fifth owned 48.4 to 55.3 percent.

A summary of other important characteristics of landowners and landholdings in the sample is presented in table 1. Average size of land owned in the wheat-corn region (region II) was the lowest of the three; whereas on a per acre basis, the value of land and buildings was the highest. The smaller average acreage of holdings in region II resulted primarily from differences in amount of rainfall and in crop yield (1, p. 11). Because in this region rainfall is more adequate and crop production more certain, an increase in crop output does not depend as heavily upon expanded acreage as in the spring or winter wheat regions. The spring wheat region (region I) had the lowest value of land and buildings of the three regions, as well as the lowest mortgage debt.

Table 1.--Acres, value, mortgage debt, and age reported by landowners in selected regions of the Great Plains, 1958

Item	Unit	Region I	Region II	Region III
Landowners	Number	2,083	2,247	1,795
Average size of holdings:	Acres	524	382	668
Cropland	Acres	319	219	369
Grazing land	Acres	160	139	267
Other land	Acres	45	24	32
Average value of land:				
Per holding	Dollars	23,536.00	35,263.00	44,611.00
Per acre	Dollars	44.92	92.31	66.78
Mortgage debt:				
Owners reporting	Percent	28.7	30.3	28.7
Average debt	Dollars	1,526.00	2,316.00	2,892.00
Average age of owner:				
Present age	Years	53.5	57.3	57.0
Age at acquisition	Years	31.0	33.4	31.1

The winter wheat region (region III) had, on the average, the largest holdings, highest value of land and buildings, and the largest mortgage debt for owners reporting mortgages. This region had the lowest percent of cropland, 54 percent as compared to 61 and 57 percent for regions I and II, respectively.

Owners in region I were the youngest and first acquired land at a slightly lower average age than owners in other regions. Their "length of ownership" was also the shortest of the three regions (22.5 years). Owners in region II were oldest in terms of both present age and age at first acquisition.

Method of Analysis

This study examines the relationships between certain characteristics of landowners and the size distribution of their landholdings in each of the three type-of-farming regions of the eastern Great Plains. The landowner characteristics examined are those which are generally considered to influence ownership distribution, and for this reason data on the characteristics are usually gathered in ownership surveys. This study was designed not only to measure their relative importance but to determine more fully their relationship to size of landholdings.

To determine the size distribution of land ownership, holdings were arrayed from the smallest to the largest, and the array was then divided into quintiles. 4/ Thus the first quintile is made up of the 20 percent of all landowners who own the smallest holdings; the fifth quintile represents the 20 percent of all landowners who own the largest tracts. By comparing ownership characteristics from smallest to largest quintiles, the nature of the relationships between characteristics and size of landholdings is revealed.

A chi-square test of independence was used to test the statistical significance of the observed relationships. The null hypothesis for this test is that size of landholding is independent of the owner characteristic being tested. If, for example, 20 percent of all landowners acquired land by inheritance, and if size is independent of the method of acquisition, approximately 20 percent of the owners in each quintile would be expected to have acquired land by inheritance. The only variation from quintile to quintile would be variation normally associated with random sampling.

If the number of respondents in a specific quintile is either greater or smaller than the number that could be expected to occur by chance at a stated probability level, it is concluded that the characteristic and size are not independent. 5/ In this report, any chi-square value greater than that expected at the 0.10 probability level is considered statistically significant.

The tables that follow present the distribution of number of landowners ranked according to the number of acres owned. Other rankings were made by value of holdings and by equity in land. Since the results of these rankings were very similar to tests based on the distribution by number of acres owned, these tables have not been included in this report. Table 2 presents the median acres and value of holdings by quintiles and regions.

FACTORS OF AGE AND ACQUISITION

The major characteristics of landowners found to be related to land distribution were method of acquisition and factors related to age--age at first acquisition and length of ownership. A third measure, present age, was statistically significant and was important largely because of its relationship to method of acquisition and age at acquisition.

4/ A small number of nonindividual owners in each region were inadvertently included in the initial data processing. The quintiles were not adjusted after deletion of these extraneous cards; hence the numbers in some quintiles are not equal. Unequal quintiles do not affect the chi-square tests.

5/ It should be emphasized that the distribution of owner characteristics expected under the null hypothesis is not necessarily the distribution that would be expected based on prior knowledge or other logical reasoning. Unless otherwise stated, "expected" is used in a statistical sense throughout this report.

Table 2.--Median size and value of landholdings by quintiles in selected regions of the Great Plains, 1958

Quintile	Region I		Region II		Region III	
	Size	Value	Size	Value	Size	Value
	Acres	Dollars	Acres	Dollars	Acres	Dollars
First	160	5,000	80	8,000	151	8,000
Second	318	11,250	160	16,000	215	19,200
Third	400	18,725	255	25,000	320	32,000
Fourth	620	28,800	400	40,000	640	50,000
Fifth	1,000	50,000	790	80,000	1,410	100,000

The measures of age are not direct or causative factors that influence the distribution of landownership. They are, however, convenient expressions for a number of factors that do affect size--physical ability, family income needs, changing goals, and the opportunity for accumulation or inheritance. Thus owners who acquired land at an early age or who had owned land a number of years were found to own the largest holdings. Tests of length of ownership indicated that the early years of ownership are the most important period for accumulation. Owners who delayed acquisition until relatively advanced ages tended to acquire smaller tracts, perhaps a reflection of changing motives for landownership.

Some people acquired land only through their own actions, others received it entirely or partially gratuitously. Owners who acquired land solely through inheritance or gift usually acquired small holdings. In the majority of cases, the transfer of wealth through inheritance did not create large landholdings; rather it was the use that was made of the opportunity presented through inheritance that determined size of holdings.

The factors are examined in the following order: Present age of owner, method of acquisition, present age-method interaction, age at acquisition, and length of ownership.

Present Age of Owner

The $\underline{X}^2$ test for independence of age and size distribution was significant at less than the 1-percent level for regions I and II and at less than the 5-percent level for region III (table 3). The null hypothesis of independence between present age and size of holdings was rejected.

Table 3.--Chi-square test of independence, present age of owner, and quintile distribution by size of holdings in selected regions of the Great Plains, 1958

Age of owner	Owners by quintiles																	
	Region I						Region II						Region III					
Years	1	2	3	4	5	Total	1	2	3	4	5	Total	1	2	3	4	5	Total
	Number																	
34 or less	45	36	24	27	15	147	29	27	16	13	7	92	23	21	20	10	4	78
35-44	68	75	80	91	73	387	55	69	62	71	39	296	37	47	35	52	35	206
45-54	73	84	108	105	108	478	90	96	91	105	98	480	89	88	95	88	94	454
55-64	90	86	112	99	118	505	113	110	116	111	129	579	86	84	85	105	105	465
65 or over	130	131	91	91	93	536	156	142	157	147	169	771	116	115	121	101	120	573
No report	10	6	4	4	6	30	8	7	9	2	3	29	8	5	4	2	0	19
Total	416	418	419	417	413	2,083	451	451	451	449	445	2,247	359	360	360	358	358	1,795
Chi-square (16df)		57.34		P	<	.005		36.75		P	<	.005		31.01		P	<	.025

Table 4.--Chi-square test of independence, method of acquisition of owner, and quintile distribution by size of holdings in selected regions of the Great Plains, 1958

Method of acquisition	Owners by quintiles																	
	Region I						Region II						Region III					
	1	2	3	4	5	Total	1	2	3	4	5	Total	1	2	3	4	5	Total
	Number																	
Purchase from relatives	72	70	83	88	80	393	58	84	79	75	86	382	48	43	38	51	58	238
Purchase from nonrelatives	181	158	181	181	172	873	173	150	147	145	143	758	106	105	131	105	112	559
Gift or inheritance	40	55	39	56	58	248	104	71	70	60	37	342	118	99	57	64	42	380
Combination of methods	51	81	61	49	53	295	57	73	99	125	139	493	33	65	77	103	113	391
Other methods	11	8	9	4	6	38	0	4	3	2	6	15	9	5	6	2	4	26
No report	61	46	46	39	44	236	59	69	53	42	34	257	45	43	51	33	29	201
Total	416	418	419	417	413	2,083	451	451	451	449	445	2,247	359	360	360	358	358	1,795
Chi-square, including "other" (16df)		26.82		P	< .05			97.50		P	<	.005		117.32		P	<	.005
Chi-square, excluding "other" (12df)		21.52		P	< .05			90.94		P	<	.005		110.78		P	<	.005

A direct relationship between owner's age and size of landholdings existed among the youngest owners in all three regions. Few land owners under the age of 35 had large holdings. This is illustrated in the table by the negative trend (i.e., a decline in the number of respondents, reading across the quintiles) in the number of owners under 35 in the highest quintiles. In regions I and II there were 3 or 4 times as many young owners in the first quintile as in the fifth. The under-35 age group in region III was nearly constant over the first three quintiles but had less than a fifth as many in the fifth quintile.

In the next age class (35-44), owners in regions II and III held land in the first four quintiles roughly in proportion to older owners but still owned less land in the fifth quintile than older owners. For the remaining age classes, age apparently had little effect on the relative position of owners. The number of owners increased with each ascending age class, but the relative distribution was largely unchanged; that is, the increase in the number of owners in the lower quintiles was about proportional to the increase in the number in the upper quintiles.

The distribution of owners in region I presented some exceptions to the preceding comments. First, the downward trend in the distribution for young owners was confined to the age 34-or-less class and, second, the number of owners 65 or over was proportionately higher in the first and second quintiles of region I than in either region II or III.

Possibly the lower capital requirements for purchase in region I enabled young owners to acquire land at an earlier age. As previously noted, the average of owners in region I was the lowest of the three regions, and these owners acquired land for the first time at a lower average age.

The number of owners who were over 64 in region I and who held land in the first and second quintiles was high. A number of these owners may have bought small tracts for retirement, but this appears unlikely in view of the size of the tracts involved (median acreage was 160 and 318 for the first and second quintiles, respectively). The data may indicate that owners of large tracts tend to dispose of part of their holdings as they grow older.

Present age, then, does provide a measure of the relative amount of land owned among younger owners. Very few of the largest tracts were owned by owners less than 45. But beyond the age of approximately 45, present age had no significant relation to landownership distribution.

Method of Acquisition

Owners were classified according to the way in which they had acquired land. The methods reported were:

1. Purchase from relatives only,

2. Purchase from nonrelatives,

3. Gift or inheritance of all land,

4. Gift or inheritance of part of land with remainder acquired by purchase or other method, and

5. Other methods--mainly exchange, tax delinquency, or homesteading.

For all regions combined, purchase from nonrelatives was used most frequently (2,190), followed by combinations of purchase and inheritance (1,179), and purchase from relatives (1,013). Inheritance alone was used by 970 owners. Only 79 owners reported other methods; these owners tended to predominate in the lower quintiles in regions I and III and in the upper quintiles in region II. Because of this tendency and the relative unimportance of this method of acquisition, additional chi-squares were computed with the "other" group eliminated.

For regions II and III, method of acquisition was significant at less than the 1-percent level; and, in region I, significant at less than the 5-percent level. Omission of "other" methods reduced $\underline{X}^2$ but did not change the significance levels (table 4).

Regions II and III exhibited more pronounced trends than region I and are first considered together. Three trends are evident:

1. Considering both methods of purchase, the proportion of owners who acquired land by purchase is nearly the same across the quintiles.

2. Owners who acquired land only through gift or inheritance tend to be highly concentrated in the lowest quintiles. Nearly three times as many owners of farms in the lowest quintile acquired land in this manner as owners in the fifth quintile.

3. Owners who acquired land through a combination of methods exhibited a trend opposite those who acquired land solely through gift or inheritance. Approximately three times as many owners in the fifth quintile acquired land in this manner as owners in the first quintile.

The greatest differences were the opposing trends for owners who acquired all their land by inheritance and those who acquired land through a combination of methods. In part, these trends may have logical explanations. First, inherited land is frequently transferred to several heirs, and this custom may have created a number of small tracts. Second, few owners who acquired land by a combination of methods would be expected in the lower quintiles, since a large proportion of transfers by sale occurred in multiples of quarter sections (160 acres); and more than one transaction of that size would exceed the median acreage of the two lowest quintiles. Some owners who acquired land by a combination of methods may have owned land at the time of inheritance. For these owners, inheritance represented an addition to their previous holdings and this increment in size may have placed them in the higher quintiles. 6/

Owners in region I did not exhibit the same trends found in regions II and III. No systematic trends in size and method of acquisition for all owners were revealed. For example, the number of owners acquiring land by a combination of methods was high in the second quintile but low in the first and fourth. In part, this may be explained by the relative unimportance of inheritance and gifts as a method of acquisition in this region. Nearly 70 percent of the respondents acquired land by purchase, compared with 57 percent in region II and 50 percent in region III.

An interesting question for which the data provide only limited information is: Why did some owners both inherit and purchase land while others made no further acquisitions after inheritance? Part of the differences may be explained by the fact that a number of owners who acquired land by inheritance were single women and others who probably had no strong motives for owning land. Consequently, method of acquisition was examined for husband and wife owners only in order to remove the influence of the differing types of owners from the relationship of method of acquisition and size distribution (table 5). Nevertheless, the opposing trends for inheritance and combination methods of acquisition were apparent in regions II and III. The trends suggest that there may be important differences in the motives for owning land and that for some owners, inheritance is important largely for the opportunity it presents to increase the size of ownership units.

The relationship of method of acquisition and size distribution in region I was about the same for husband and wife owners (table 5) as it was for all types of owners combined. The distribution was not statistically significant.

Method of Purchase

So far, purchases from relatives and nonrelatives have been considered together. It is interesting to compare the size distribution of owners who purchased from relatives with that of owners who purchased from nonrelatives.

6/ Inheritance or gifts also may occur in the form of money or other aids to acquisition and the inheritance of land does not necessarily mean the land is unencumbered. Although both of these factors may be important in individual cases, data are not available for an investigation of their extent or influence on land acquisition.

Table 5.--Chi-square test of independence, method of acquisition of husband and wife owners, and quintile distribution of size of holdings in selected regions of the Great Plains, 1958

Method of acquisition	Owners by quintiles																	
	Region I						Region II						Region III					
	1	2	3	4	5	Total	1	2	3	4	5	Total	1	2	3	4	5	Total
	Number																	
Purchase from relatives	36	37	50	53	50	226	27	61	45	43	50	226	30	26	24	39	37	156
Purchase from nonrelatives	93	87	110	118	116	524	114	105	87	101	90	497	66	52	78	75	65	336
Gift or inheritance	23	28	27	35	34	147	51	35	27	31	17	161	57	49	29	32	14	181
Combination of methods	28	32	40	33	35	168	28	37	63	73	76	277	18	34	42	71	68	233
Total	180	184	227	239	235	1,065	220	238	222	248	233	1,161	171	161	173	217	184	906
Chi-square (12df)		3.49		NS				70.64		P	< .005			78.83			P <	.005

Table 6.--Landowners by age and percentage distribution by method of acquisition in selected regions of the Great Plains, 1958

Age of owner	Method of acquisition								
	Region I			Region II			Region III		
Years	Purchase	Inheritance	Combination	Purchase	Inheritance	Combination	Purchase	Inheritance	Combination
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
44 or less	68.8	14.5	16.7	69.0	12.1	18.9	52.5	26.4	21.1
45-54	72.3	14.0	13.7	60.4	16.4	23.2	55.9	23.4	20.7
55-64	67.0	15.1	17.9	53.7	18.0	28.3	47.9	25.6	26.5
65 and over	72.6	11.2	16.2	53.1	20.0	26.9	48.0	22.0	30.0
All owners	70.2	13.7	16.1	57.7	17.3	25.0	50.8	24.0	25.2

One-third of the owners who acquired land by purchase bought from related sellers. Unique opportunities for some owners to acquire land may have resulted from a family relationship between buyer and seller. Even if the price of land was not affected by kinship, such a relationship often gave the buyer better knowledge of the opportunity to buy, and more generous terms than would otherwise be likely.

Differences in the size distribution of the number of owners who purchased from relatives and from nonrelatives were tested by chi-square. Only the distribution for region II was statistically significant at the 10 percent level. In this region owners who purchased land from relatives acquired significantly more farms in the upper quintiles, while the reverse was true for owners who purchased from nonrelated sellers. The differences were not significant in regions II and III which indicates that, in these regions, kinship between buyers and sellers apparently did not affect the size distribution.

Present Age-Method Interaction

The chi-square tests for independence of present age and the distribution of landholdings were significant largely because the youngest owners held fewer large tracts. This may have occurred because (1) young owners have not had as much opportunity to accumulate capital and experience as older owners, and (2) with less "exposure to ownership" they have had less opportunity to acquire land through inheritance.

The relationship of age and the major methods of acquisition are shown in table 6. Regions II and III display similar trends; with advancing age, the percentage of owners who purchased land decreased and the percentage of owners who inherited, or used a combination of methods to acquire land, increased. Method of acquisition does not appear related to age in region I.

Because the method of acquisition is related to age, at least in regions II and III, it was decided to test the relationship between present age and the size distribution of landownership while holding method of acquisition constant. This was done by classifying owners according to the way in which they acquired their holdings and then testing for relationships between present age and size. These tables are not presented; however, the results are summarized below.

Among owners who acquired land solely through purchase, size was significantly related to age in all regions. There were nearly twice as many owners under age 45 in the lower quintiles as there were in the upper quintiles. Beyond this age, however, owners were either evenly distributed among the quintiles or concentrated in the upper quintiles.

Among owners who inherited land or acquired land by a combination of methods there was no significant relationship between present age and size distribution. Owners who inherited land tended to hold more small tracts, regardless of age, while owners who used a combination of methods tended to acquire larger holdings, also regardless of age.

These relationships are logical. Inheritance is essentially a passive method of acquiring land and thus neither present age nor the age at which the land was inherited would have an important effect on the size of the inheritance. Owners who acquired land by a combination of methods usually inherited a part of their land. To the extent that inheritance provided young landowners with increased net worth for collateral purposes, they were able to overcome disadvantages faced by those owners who acquired land only by purchase.

The only group for which age was significantly related to the size distribution were those owners who acquired land solely by purchase. Here time is important in enabling prospective owners to accumulate capital and experience and the younger owners have not had the accumulation opportunities that older owners have had.

Age at Acquisition

The survey also asked the age at which respondents first acquired ownership of land. When tested by chi-square, the relationship of age at acquisition and size of holdings was of greater significance than the present age-size relationship (table 7).

More than one-half of the respondents first acquired land before they were 35, and this age roughly marks the dividing point in the relationships of age at acquisition and size distribution. In regions II and III, owners who acquired land when they were less than 30 years old were nearly twice as numerous in the higher quintiles as in the lower. The age classes 30-34 and 35-39 were largely transitional groups with a fairly even distribution of numbers across the quintiles. Owners who did not acquire land until they were 40 or older tended to acquire small holdings.

Region I exhibited the same trends but they were less pronounced and the upward trend extended through the 30-34 age class; here again, as in regions II and III, the trend was downward for owners who were over 40 when they first acquired land.

The small number of owners (71, 127, and 71) in each region who did not acquire land until they were 55 or older possibly purchased land for retirement or investment. These owners were largely in the lower quintiles.

Table 7.--Chi-square test of independence, age of owner at acquisition, and quintile distribution by size of holdings in selected regions of the Great Plains, 1958

Age at acquisition	Owners by quintiles																	
	Region I						Region II						Region III					
Years	1	2	3	4	5	Total	1	2	3	4	5	Total	1	2	3	4	5	Total
	Number																	
24 or less	82	64	85	90	111	432	39	53	53	51	87	283	56	63	75	82	86	362
25-29	68	82	89	94	98	431	49	72	76	107	86	390	47	65	70	72	92	346
30-34	73	77	87	88	84	409	93	67	91	83	98	432	64	54	54	72	67	311
35-39	46	55	53	48	46	248	71	70	65	71	62	339	45	40	61	51	56	253
40-44	54	44	38	40	23	199	60	60	58	54	42	274	42	40	40	30	29	181
45 or more	72	78	49	44	35	278	113	103	82	69	52	419	82	70	43	35	18	248
No report	21	18	18	13	16	86	26	26	26	14	18	110	23	28	17	16	10	94
Total	416	418	419	417	413	2,083	451	451	451	449	445	2,247	359	360	360	358	358	1,795
Chi-square (20df)		59.34		P	<	.005		86.64			P <	.005		92.12			P <	.005

Table 8.--Chi-square test of independence, length of ownership, and quintile distribution by size of holdings in selected regions of the Great Plains, 1958

Length of ownership	Owners by quintiles																	
	Region I						Region II						Region III					
Years	1	2	3	4	5	Total	1	2	3	4	5	Total	1	2	3	4	5	Total
	Number																	
Less than 5	37	31	19	20	8	115	58	48	31	14	7	158	32	21	14	9	3	79
5-9	52	46	49	38	24	209	65	66	59	44	23	257	53	44	25	24	16	162
10-14	81	104	103	93	69	450	73	96	73	88	54	384	48	56	68	55	31	258
15-19	51	48	70	94	85	348	56	39	56	58	71	280	57	33	54	51	55	250
20-24	36	27	26	29	44	162	35	38	40	47	47	207	21	51	38	43	45	198
25-29	18	24	28	22	25	117	23	24	31	33	35	146	27	27	26	40	36	156
30 or more	110	115	101	107	138	571	107	117	132	149	190	695	92	96	117	120	160	585
Total	385	395	396	403	393	1,972	417	428	422	433	427	2,127	330	328	342	342	346	1,688
Chi-square (24df)		84.26		P	<	.005	145.16			P	<	.005		126.00			P <	.005

These trends indicate that owners who began the acquisition process at an early age tended to acquire large holdings, reflecting the greater span of time available to acquire additional land and increase size. Owners who acquired land at an early age also may have received more family assistance than those acquiring land later in life; however, data are not available for an investigation of this point.

Owners who did not begin the acquisition process until later in life tended to acquire small tracts. This trend may have been due to the increasing importance of inheritance as a method of acquisition for owners in these age classes and also may have reflected the changing goals of landownership.

Length of Ownership

Neither present age nor age at initial acquisition of land alone is a complete measure of the effect of age on size of ownership unit. A third measure, length of ownership, was computed by subtracting age at acquisition from present age.

Of the three measures of age, length of ownership provided the strongest relationship with size of holdings (table 8). Owners who had owned land less than 10 years held only a small proportion of the largest acreages, as evidenced by the small number appearing in the upper quintiles. Owners with 10 to 20 years of ownership were more evenly distributed among the quintiles, whereas those whose length of ownership exceeded 20 years predominated in the upper quintiles.

A factor that may affect the relationship between length of ownership and size is the differing economic environment encountered by owners acquiring land at different periods of time. This might have been especially important for those owners who had owned land for only a few years at the time of this study. Willsie and Ottoson, in a study of factors affecting the financial progress of dryland farmers in Central Nebraska (8), found that the 1940's and early 1950's were more favorable years for capital accumulation than more recent years. Thus, owners in this study who had owned land for approximately 10 years or more benefited from favorable economic conditions not available to owners with shorter periods of ownership.

The interrelationship of present age and length of ownership was tested in the same manner as present age and method of acquisition (page 10). Even though the results were not completely consistent between regions, they confirm that present age is much less important than length of ownership in explaining the distribution of land. For example, when only those owners owning land for less than 10 years were examined, present age was not significantly related to size distribution in any region.

FACTORS OF TENURE, OCCUPATION, AND TYPE OF OWNER

The relationship of three additional factors--tenure, occupation, and type of owner--and the size distribution of landholdings were examined. However, the relationship between these factors and size is not as direct as the relationship of other factors investigated. For example, tenure probably has little effect on the size of ownership unit in the same sense that method of acquisition or length of ownership may have. More likely, tenure is the result of size; that is, the size of an individual's holding may determine the use he makes of it. Similarly, the predominance of housewives or single women in the lower quintiles may be due to the large number of these owners who inherit land and who do not expand their holdings.

In the information gathered, relationships of these characteristics and size distribution were largely as expected from general knowledge; however, chi-squares were computed and are included here as a matter of interest.

Tenure of Owner

Respondents were classified into five tenure groups on the basis of the way their farmland was operated:

1. Full owner-operators--those who own all the land they operate,
2. Part owner-operators--those who operate all the land they own and rent additional land from others,
3. Part owner-operator landlords--those who rent land to others and from others and operate at least some of their own land,
4. Full owner-operator landlords--those who rent land to others and operate some of their own land, and
5. Landlords--those who rent land to others and operate none of their own land.

The tenure-size relationships were largely as expected from previous knowledge (table 9). The strongest relationships with size distribution occurred for full and part owner-operator landlords. These tenure classes would be expected to occur in the higher quintiles, since an owner would require considerable holdings before he could both operate some farmland and rent out additional land.

Although landlords were an important tenure group in all quintiles, they were somewhat more numerous in the smaller size groups of ownership. The landlords in the upper quintiles were predominately retired farmers. A factor

Table 9.--Chi-square test of independence, tenure of owner and quintile distribution of holdings in selected regions of the Great Plains, 1958

Tenure	Owners by quintiles																	
	Region I						Region II						Region III					
	1	2	3	4	5	Total	1	2	3	4	5	Total	1	2	3	4	5	Total
	Number																	
Full owner-operator	107	136	145	174	116	678	145	112	132	100	84	573	91	80	82	74	57	384
Part owner-operator	89	103	138	104	100	534	100	134	87	90	45	456	59	100	100	84	61	404
Part owner-operator landlord	5	8	16	12	37	78	9	9	18	22	48	106	7	11	18	36	58	130
Full owner-operator landlord	39	34	30	37	74	214	30	32	56	82	120	320	32	35	35	38	74	214
Landlord	176	137	90	90	86	579	167	164	158	155	148	792	170	134	125	126	108	663
Total	416	418	419	417	413	2,083	451	451	451	449	445	2,247	359	360	360	358	358	1,795
Chi-square (16df)		158.65		P <		.005		205.04			P <	.005		144.35			P <	.005

Table 10.--Chi-square test of independence, occupation of owner and quintile distribution of holdings, selected regions of the Great Plains, 1958

Occupation	Owners by quintiles																	
	Region I						Region II						Region III					
	1	2	3	4	5	Total	1	2	3	4	5	Total	1	2	3	4	5	Total
	Number																	
Non-retired:																		
Farmer	150	227	282	288	275	1,222	174	241	223	242	229	1,109	98	176	193	200	211	878
Housewife	43	27	17	10	11	108	49	30	33	26	25	163	55	35	32	28	23	173
Business/professional	42	25	16	22	26	131	37	23	35	32	31	158	27	25	26	18	22	118
Other and no report	73	57	33	26	24	213	86	55	45	33	39	258	95	49	36	35	32	247
Retired:																		
Farmer	34	30	26	31	31	152	34	44	49	57	60	244	16	22	27	32	37	134
Other and no report	62	33	34	32	29	190	50	45	48	47	51	241	50	42	37	33	26	188
No status report	12	19	11	8	17	67	21	13	18	12	10	74	18	11	9	12	7	57
Total	416	418	419	417	413	2,083	451	451	451	449	445	2,247	359	360	360	358	358	1,795
Chi-square (20df)		167.45		P <		.005		72.73			P <	.005		142.52			P <	.005

contributing to the higher number of landlords in the lower quintiles was the concentration of single women and the "other" occupational groups in these quintiles. The single women "other" groups of owners were classified predominately as "landlords."

The distribution of full and part owner-operators varied between regions, although the differences were not great. In region I full and part owner-operators predominated in the middle quintiles, whereas in region II their numbers were negatively related to size. Part owners in region III were grouped mainly in the middle quintiles, while the number of full owner-operators declined across the quintiles.

Occupation

Owners were classified by their occupation and their retired or nonretired status. The occupation classes were farmer, housewife, business or professional, and others. A few owners reported status but not occupation; these were included in the appropriate "other" occupation classes (table 10).

The occupation-size distribution was significant in all regions. More than half of all owners reported farming as an occupation, and the proportion of farmers was greatest in the upper quintiles. Only small numbers (98 in all) of active farmers in each region were classified as landlords; the remainder were in other tenure classifications. On the other hand, owners in the remaining occupational classifications were predominantly landlords. These owners probably acquired land through inheritance or purchased land for investment. Owners in occupations other than farming tended to own small tracts.

Type of Owner

Type of owner was also significantly related to size of holdings in each region (table 11). The relationship was strongest for the "combination" type of owners--a multiple ownership group consisting of a partnership and either a single man, single woman, or husband and wife. These owners were largely in the upper quintiles. They acquired land primarily through purchase (43 percent) or a combination of purchase and inheritance (38 percent).

In region I, single men and single women owned proportionately fewer large tracts than husbands and wives. In the other regions, the relationship of type of owner and size distribution (ignoring combination owners) was not as pronounced as in region I. In region II the relationship was not statistically significant at the 10-percent level; in region III it was significant at the 5-percent level.

Table 11.--Chi-square test of independence, type of owner, and quintile distribution of holdings in selected regions of the Great Plains, 1958

Type of owner	Owners by quintiles																	
	Region I						Region II						Region III					
	1	2	3	4	5	Total	1	2	3	4	5	Total	1	2	3	4	5	Total
	Number																	
Single man	87	101	70	74	50	382	78	76	73	66	65	358	41	50	44	40	53	228
Single woman	48	45	28	16	10	147	58	41	50	33	24	206	61	57	49	31	31	229
Husband and wife	208	215	266	257	270	1,216	269	261	253	266	256	1,305	208	195	192	231	198	1,024
Partnership	29	26	23	27	24	129	23	32	25	27	25	132	29	24	23	18	23	117
Combination, partnership, and other	3	6	11	21	30	71	4	8	17	33	54	116	2	4	16	19	34	75
No report	41	25	21	22	29	138	19	33	33	24	21	130	18	30	36	19	19	122
Total	416	418	419	417	413	2,083	451	451	451	449	445	2,247	359	360	360	358	358	1,795
Chi-square (16df)		108.57		P <		.005		93.77		P <		.005		71.13		P <		.005
Chi-square less combination (12df)		72.17		P <		.005		16.38		P		NS		25.40		P <		.025

VALUE AND EQUITY

In addition to distributions by acreage, arrays also were made on the value of landholdings and on equity in the ownership unit. Value of holdings was used as a measure of size of holdings in recognition that units of equal acreage may not be of equal value because of differences in location, soil quality, buildings, and other factors. Equity--computed by subtracting mortgage debt from the reported value of holdings--was included as a measure of the "degree" of ownership. Equity may be a more meaningful measure of size than value in some areas of the United States; but in these regions, where less than a third of the owners reported outstanding mortgages and where the average debt was low (as a percent of average total value), the differences in arrays by value and by equity were minor.

The results of chi-square tests based on value and equity were similar to tests based on acreage distributions and so are not included. The most important differences (or similarities) between the distributions by acreage and value are presented below. Because of the similarities in the distribution these findings should be considered only as indicative of relationships that *may* exist.

Distributions by value may be a more important measure of relative position than acreage distributions for factors relating to age (*present age*, *age at acquisition*, and *length of ownership*). Trends in size distribution based on these factors were slightly more pronounced for value than for acreage in regions II and III. This indicates that not only did young owners tend to acquire proportionately more small holdings, but that they also acquired holdings of lower value. The same was true for owners who had owned land for only a short time. Conversely, older owners or those with longer periods of ownership held larger and more valuable tracts.

The relationships of method of acquisition and size distribution were similar regardless of the measure of size used.

The number of nonretired farmers owning land in the highest quintiles was slightly higher when the quintiles were based on value. Apparently farmers attached more value to their holdings than owners in other occupations who, presumably, were not as dependent on land for their income.

IMPLICATIONS

The landowner characteristics examined in this report are those which are generally considered to influence ownership distribution and for which data are collected in most ownership surveys. This study was designed not only to measure the relative importance of the landowner characteristics examined but also to determine, more fully than is revealed by simple averages and cross-classifications, the relationship of these characteristics to size distribution.

Generally, the relationships revealed are logical in nature. Many of the characteristics are interrelated and these relationships must be considered in any analysis. For example, present age is significantly related to size distribution, but this relationship can be explained largely in terms of the relation of present age to length of ownership and method of acquisition.

The data examined are for one section of the United States and for one period of time. Further studies are needed to determine the importance of these factors in other areas. The differences in the relationship of the characteristics and size distribution among the three regions within the eastern Great Plains States suggest that the relative importance of the characteristics may vary greatly among other areas of the United States, although the basic relationships probably still exist.

The winter-wheat and wheat-corn regions of the Great Plains exhibited similar relationships, but a number of these relationships did not hold or were not as pronounced in the spring-wheat region. A possible explanation of these differences may lie in the lower capital requirements for land acquisition in region I. Land in this region was valued at less than half the per-acre value of land in region II and two-thirds the value of land in region III. Possibly with lower capital requirements more owners are able to acquire land by purchase, and at an earlier average age. If so, one would expect inheritance and time to be more important in areas of high land values.

It should also be recognized that the data are a cross sectional sample of landownership at a specific point in time. The data do not provide information on conditions that existed before the survey, nor do they predict what conditions may exist in the future. For example, positions of owners of different ages or of different length of ownership intervals may differ because some have experienced only prosperous economic environments while others may have had to recover from financial setbacks brought about by depressions or prolonged drought. The observations provide, however, a basis for estimating relationships that may prevail in a future with no major changes in the economic environment over time.

APPENDIX

A Note on the Method of Analysis

The data were analyzed by the chi-square test of independence. This nonparametric test was chosen for several reasons. First, the characteristics investigated are essentially attributes rather than variables, and a number of these attributes are measured only on a nominal scale. The usual parametric tests, such as an analysis of variance, require measurement in at least an interval scale and hence are not appropriate.

One of the objectives of this study was to determine the nature of relationships between the characteristics and the size distribution of holdings. Many parametric methods, particularly the various regression techniques, require determination, in advance, of the relationship that is being sought (or, alternatively, require a number of trials to determine which hypothesized relationship best fits the data). The study reveals that many of the relationships are far from simple and that analysis by regression technique would necessarily be very complex, even if the problems of measurements could be resolved (4).

Additionally, the validity of all parametric techniques depends on the assumption that the data are from a normally distributed population. As nonparametric tests do not require this assumption, conclusions from the analysis apply generally rather than only to populations with normal distributions. When the assumption of a normal distribution is valid, however, parametric tests are usually more powerful than equivalent nonparametric methods.

An important advantage of chi-square is that computation is relatively fast and simple on a desk calculator. The analyses presented in this report were programmed, but the preliminary investigations were computed manually. Manual computation is especially useful in preliminary analyses as the major sources of high X^2 values can be readily identified by examining the expected and actual frequencies occurring in each cell of the contingency table. This procedure facilitates the identification of trends or other variations in the data.

The chi-square test requires that data be classified into discrete categories (quintiles, in this instance). A nonparametric test that does not require discrete categories, and hence utilizes more of the information for each observation, is the Kruskal-Wallis one-way analysis of variance. The Kruskal-Wallis technique tests the same null hypothesis as chi-square: that the k samples (say, the five tenure classes) come from the same population. In this test each of the N observations is replaced by a rank number and the sum of the ranks in each sample is found. The Kruskal-Wallis test determines if these sums of ranks are so disparate that it is unlikely the samples were all drawn from the same population.

Because N was approximately 2,000 in each region of the study, manual computation was laborious and this technique was not used in the final analysis. Where N is smaller, the Kruskal-Wallis test may be preferred to X^2 because it is more sensitive to differences among the k samples.

The distribution of size of landholdings was divided into quintiles rather than size classes in order to provide an equal number in each division from small to large holdings. This procedure facilitates the examination of changes across the quintiles (*i.e.*, from quintile 1 to quintile 5) in the number of respondents possessing a particular characteristic. However, this procedure does not yield truly discrete categories because holdings tend to cluster around certain values--generally 160 acres or multiples thereof. As a result, certain size holdings partially extend across adjacent quintiles, and the proportion of owners possessing specific attributes in the two quintiles is partially determined by the arrangement of the punch cards prior to division into quintiles. The overlap may be important between quintiles 2 and 3 in region I, between quintiles 3 and 4 in region II, and between quintiles 1 and 2 in region III. Since these quintiles are not uniquely determined, too much confidence should not be placed in comparisons between them.

Value of landholdings was much more heterogeneous and the problem of overlapping value did not occur. Comparisons of arrays on acres and on value indicate that the problem of overlapping acreage quintiles is not serious.

Also, the indeterminacy of the quintiles noted probably did not create a large degree of error in the analysis because the range in size is an almost continuous variable and the division into quintiles is of an arbitrary nature. Thus, there is no reason to expect a particular characteristic to occur in any specific quintile. More logically, if an attribute does influence owners' relative positions, it will likely be expressed as a positive or negative trend from lowest to highest quintile. Chance variation between adjoining quintiles (because of the indeterminacy of the quintiles) may contribute to the X^2 value, but the contribution will be small relative to the X^2 variance arising from trends.

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